

### ABSTRACT OF THE DISCLOSURE

A polymer electrolyte fuel cell (PEFC) is designed to operate on a reformate fuel stream containing oxygen and diluted hydrogen fuel with CO impurities. A polymer electrolyte membrane has an electrocatalytic surface formed from an electrocatalyst mixed with the polymer and bonded on an anode side of the membrane. An anode backing is formed of a porous electrically conductive material and has a first surface abutting the electrocatalytic surface and a second surface facing away from the membrane. The second surface has an oxidation catalyst layer effective to catalyze the oxidation of CO by oxygen present in the fuel stream where at least the layer of oxidation catalyst is formed of a non-precious metal oxidation catalyst selected from the group consisting of Cu, Fe, Co, Tb, W, Mo, Sn, and oxides thereof, and other metals having at least two low oxidation states.

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